

Montana Teen Driver Education and Training

Module 5.4

Managing Risk with Vehicle and Highway Design

Managing Risk - Objectives

Students are expected to describe:

- the crash survival features incorporated into highway and vehicular design;
- collision types and actions to control the consequences of a crash;
- how improved highway and vehicle technology helps minimize the consequences of a crash.

Vehicle and Highway Risks



Is driving safe or dangerous?



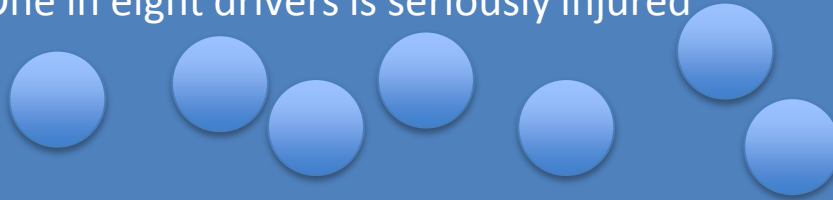
Do you know someone who crashed?



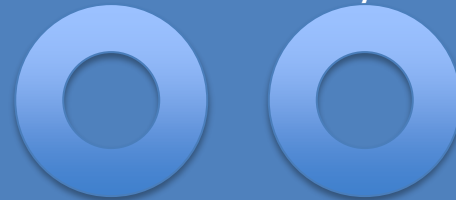
One in five drivers is involved in a serious crash



One in eight drivers is seriously injured



One in three have a friend or relative seriously injured or killed in a crash



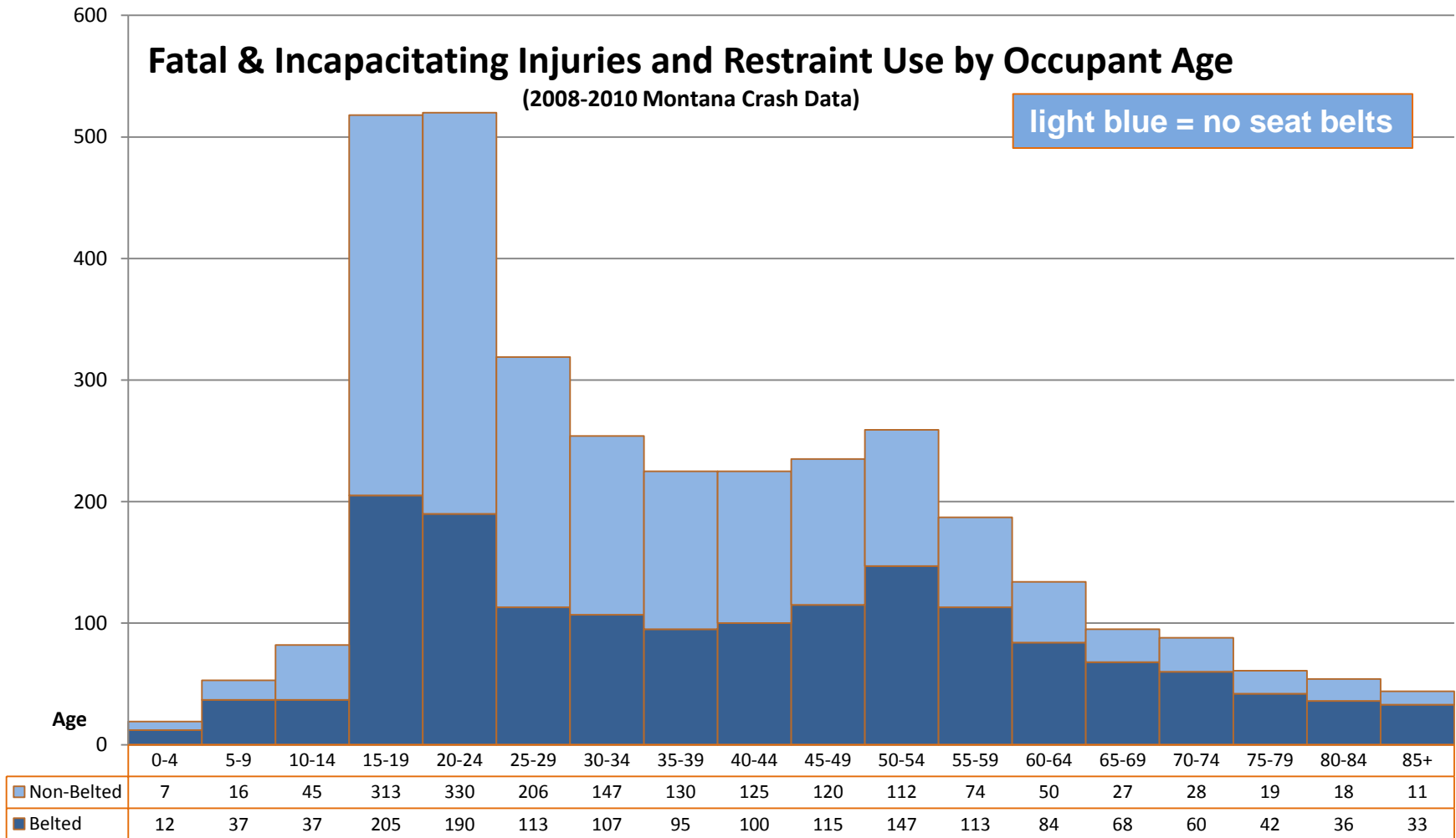
Montana Crash Data

Number of Severely Injured Vehicle Occupants

Fatal & Incapacitating Injuries and Restraint Use by Occupant Age

(2008-2010 Montana Crash Data)

light blue = no seat belts

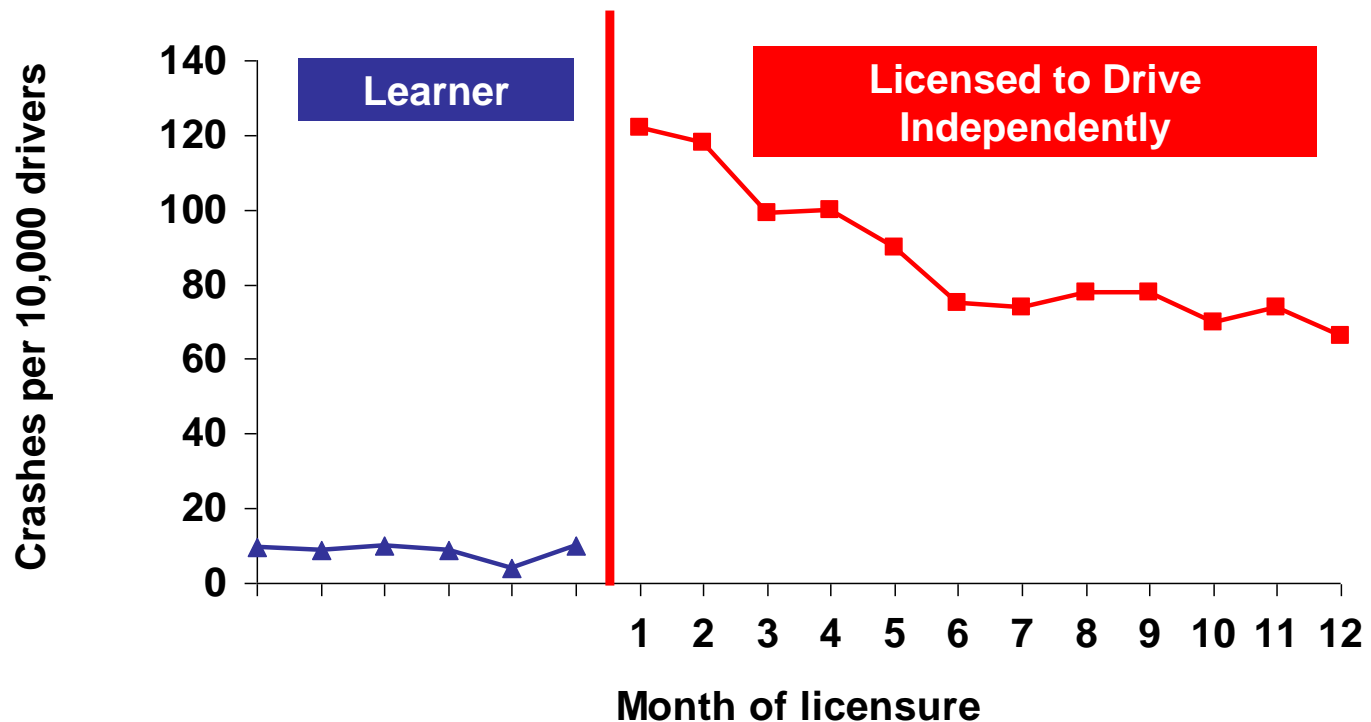


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Teen drivers are inexperienced

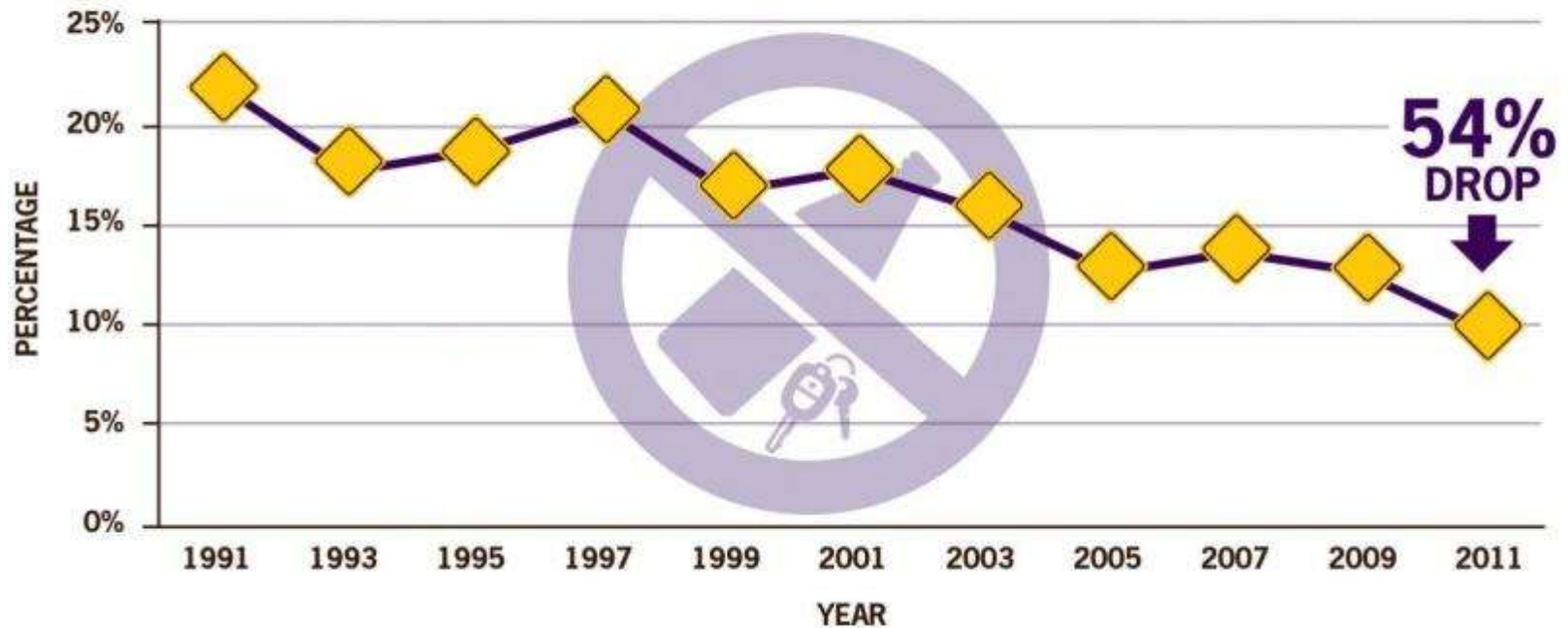
Crash Rate by Licensure Month



Adapted from: Mayhew et al., 2003 - Accident Analysis and Prevention

Teen Drinking and Driving

The percentage of teens in high school, aged 16 or older, who drink and drive has decreased by more than half since 1991.



Source: CDC Vital Signs, 2012. www.cdc.gov/vitalsigns.

Montana Teen Drivers (Age 15-19)
Alcohol-related fatalities decreased 54.5%
11 in 2010 to 5 in 2011

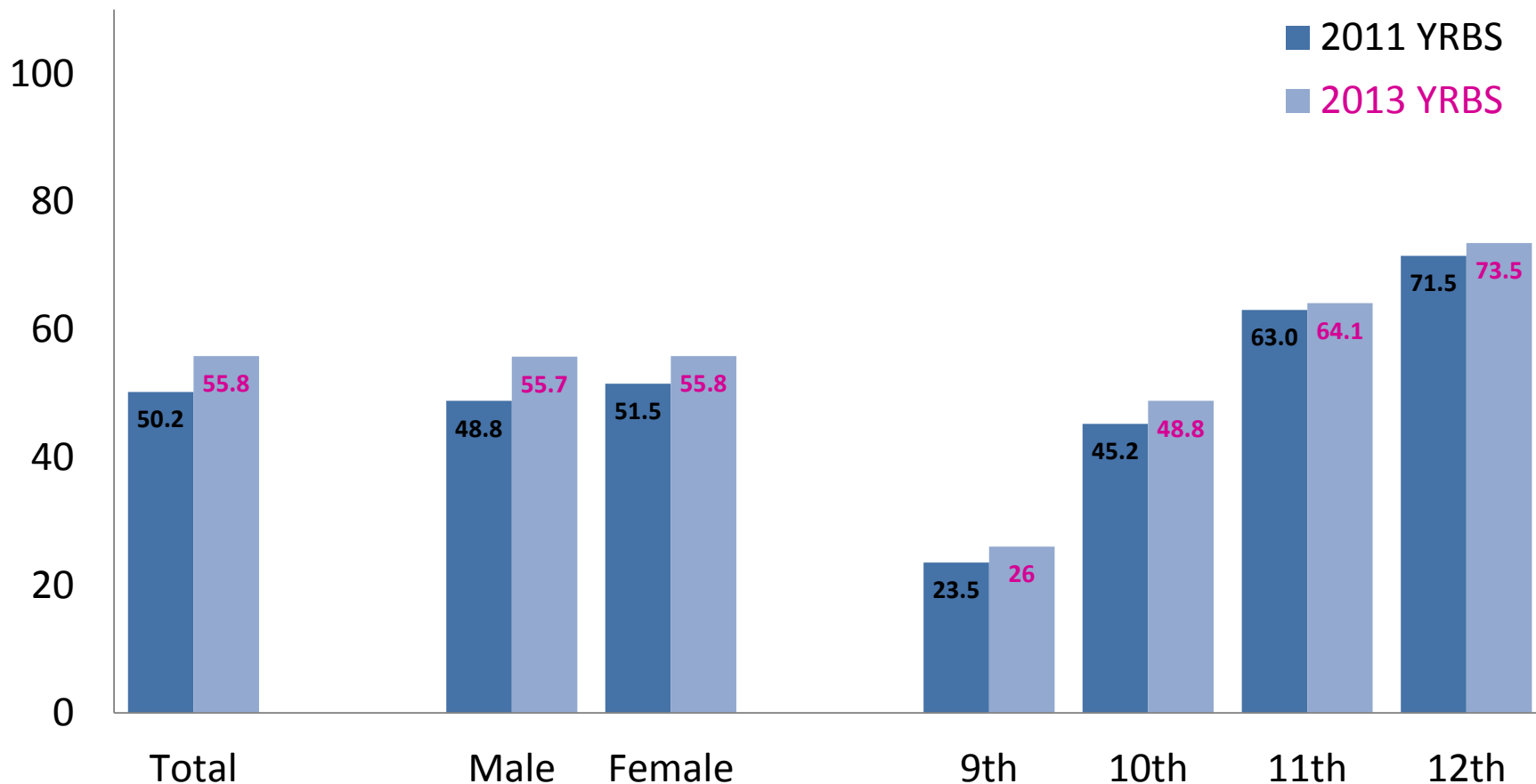
MDT Crash Data



Montana High School Survey

Texting while driving

Among students who drove a car or other vehicle during the past 30 days, the percentage who texted or e-mailed while driving on one or more of the past 30 days.



Teen Drivers Risk Death with Young Passengers

A 16- or 17-year-old driver's **RISK OF BEING KILLED IN A CRASH** increases when there are young passengers in the vehicle.

Compared to driving without any passengers, **THE RISK:**



QUADRUPLES when carrying
3 or more passengers younger than 21



DOUBLES when carrying
2 passengers younger than 21



INCREASES by 44 % when
carrying 1 passenger younger than 21



DECREASES by 62 %
when an adult age 35+ is in the vehicle

Adults 35+



Passengers under 21



Teen Drivers (ages 16 or 17)



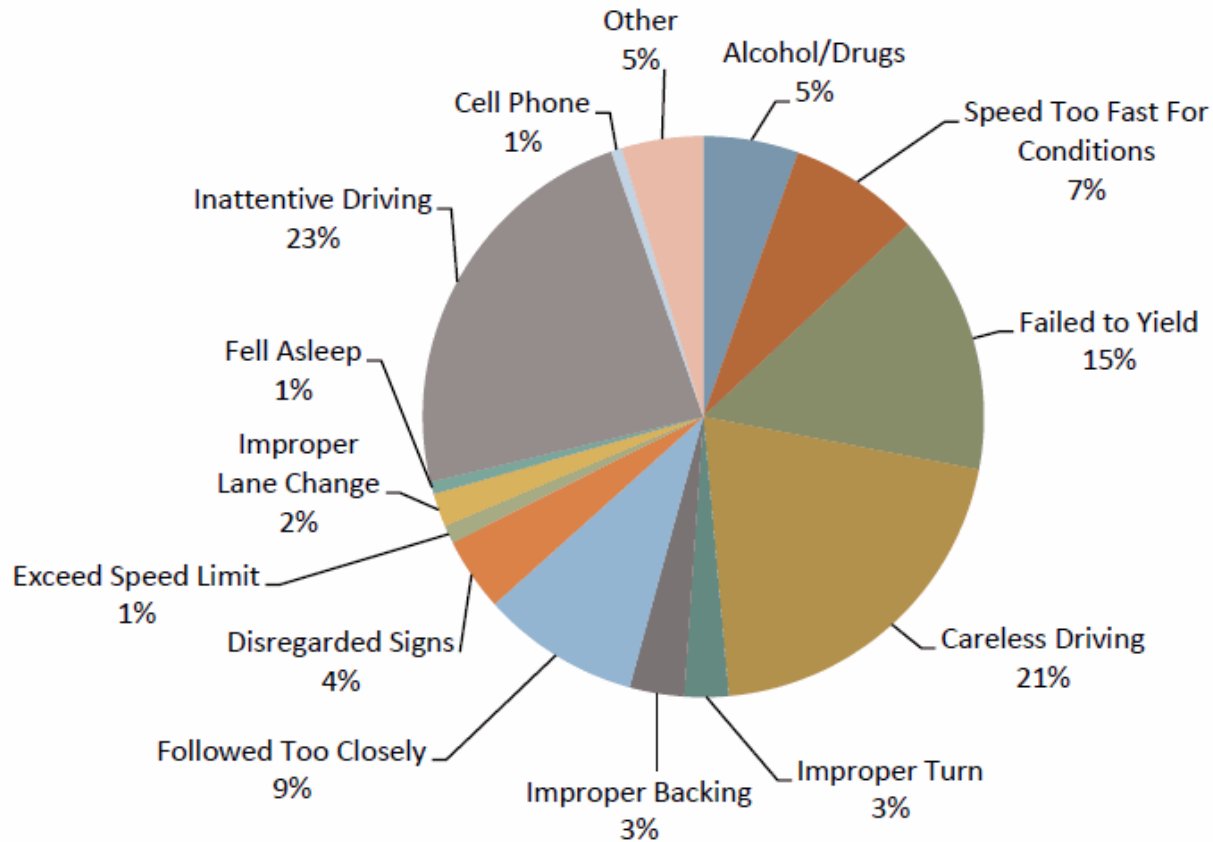
Teen Driver Risk in Relation to Age and Number of Passengers AAA Foundation for Traffic Safety, MAY 2012



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Driver's Contributing Circumstances in Crashes (2009 Data)



Source: Montana Department of Transportation – Safety Management System

90% of crashes are caused by driver errors.

Student Activity 1

Risk on the road is complicated by....

- Heads together – groups of 2 or 3
- List at least 10 driving risk factors
- Identify strategies to manage driving risks

Risk = chance of injury, damage or loss

Engineering Road Safety Solutions





MDT Improving Montana Roads and Bridges



[Return to FHWA Office of Safety Web Site](#)

Office of Safety Proven Safety Countermeasures

These nine countermeasures address crashes that occur in the focus areas of intersections, pedestrians, and roadway departure.



Safe Roads for a Safer Future
Investment in roadway safety saves lives

Improving safety is a top priority for the U.S. Department of Transportation, and FHWA remains committed to reducing highway fatalities and serious injuries on our Nation's highways. We are highly confident that certain processes, infrastructure design techniques, and highway features are effective and their use should be encouraged.



2012 "Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures" ([HTML](#), [PDF 78 KB](#))

In January 2012, FHWA issued a "[Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures](#)". This guidance takes into consideration the latest safety research to advance a group of countermeasures that have shown great effectiveness in improving safety. Safety practitioners are encouraged to consider this set of countermeasures that are research-proven, but not widely applied on a national basis.

Click on one of the nine countermeasures below for more information and a downloadable fact sheet. Each fact sheet provides more detailed descriptions, related research studies, and evaluations of each of these countermeasures. Further information on each countermeasure can also be found at the Crash Modification Factors Clearinghouse (<http://www.cmfclearinghouse.org/>).



[Roundabouts](#)



[Corridor Access Management](#)



[Backplates with Retroreflective Borders](#)



[Longitudinal Rumble Strips and Stripes on Two-Lane Roads](#)



[Enhanced Delineation and Friction for Horizontal Curves](#)



[Safety Edge](#)



[Medians and Pedestrian Crossing Islands in Urban and Suburban Areas](#)

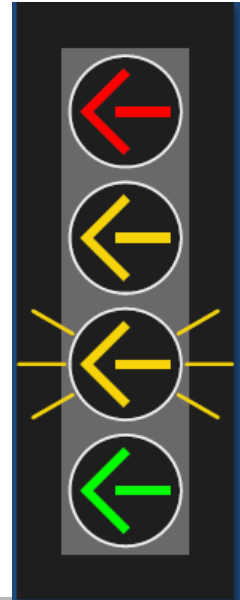


[Pedestrian Hybrid Beacon](#)



[Road Diet](#)

Cable barriers, roundabouts and more



Technology: Driving the Development of Safer Cars



5-Star Safety Ratings

More Stars. Safer Cars.



Electronic Stability Control (ESC):
Maintains vehicle control



Advanced Head Restraints:
Reduce potential head/neck injuries in crashes



Advanced Frontal Air Bags:
Protect in frontal crashes, shielding the driver's and front passenger's head, neck, and chest



Lane Departure Warning (LDW): Monitors lane markings on the road and cautions driver of unintentional lane drift



Side Air Bags and Curtains:
Protect in side crashes shielding a passenger's head, neck, chest, and pelvis



Safety Belt Load Limiter and Safety Belt Pretensioner:
Absorb crash energy and tighten belts to restrain occupants



Forward Collision Warning (FCW):
Detects vehicles ahead, cautioning drivers of impending collisions



Crash Avoidance



Crash Protection

Collision Types



**Rollover safety
cage intact.**

**Seat belt use
saved teen driver.**



1959 Chevrolet Bel Air vs. 2009 Chevrolet Malibu



2009 Chevrolet Malibu post-crash



1959 Chevrolet Bel Air post-crash



In the crash test involving the two Chevrolets, the 2009 Malibu's occupant compartment remained intact (above left) while the one in the 1959 Bel Air (right) collapsed.

Crash Forces and Consequences

Three collisions in every crash:

- **Vehicle**
- **Body**
- **Internal Organs**



Driving Safely



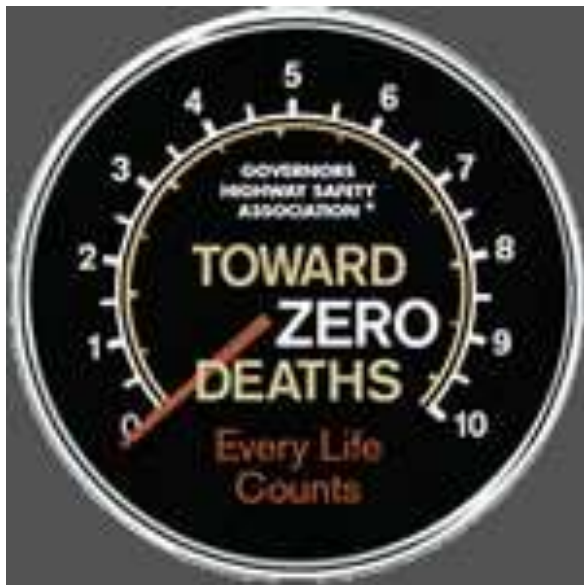
What are the risks facing young teen drivers?

- Inexperience
- Speed
- Distractions
- Fatigue
- Alcohol is involved in about 16% of fatal crashes involving 16- and 17-year-old drivers.

These factors cause crashes, but what ***kills***?

Not wearing a seat belt ...

Plan2Live and other resources



plan2live a safety movement from the Montana Department of Transportation

WHY BUCKLE UP | **KNOW THE LAW** | **MYTH CRASHERS**

Myth Crashers - Going to Extremes to Prevent Dr

Post a BUCKLE UP REMINDER

Visit Plan2Live's DUI SITE

SETT
SAFETY ENFORCEMENT TRAFFIC TEAM

WATCH FOR MOTORCYCLES

DRINKING AND DRIVING

It's a myth if you think you drive better under the influence. Our own Myth Crasher Crew goes to extremes to show you the truth.

You drive better intoxicated?
Beer goggles prove just how wrong you are
Download: [video | mp4](#)

Take it to the extreme to keep your friends safe
Creative ways to keep your friends from driving under the influence
Download: [video | mp4](#)

SEATBELTS

People who don't wear seat belts spout myths and make excuses. And, you know what? The truth shatters them. Seat belts save lives. It's been proven repeatedly by car manufacturers, government testing, accident reports and now our own Myth Crasher Crew.

FOLLOW US ON [Facebook](#) | WATCH US ON [YouTube](#) | [MORE INFO](#)



Practice driving at night and in varied road and stormy weather conditions

Highest lifetime crash risk is in the first year of driving



Will your next car or truck drive itself?



Driver Decisions

- What actions can you take to avoid and control crash consequences?
- What will you do when the dashboard light flashes or the buzzer sounds?
- Chain of events and series of corrections.





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Five-Star Drivers ★ Five-Star Vehicles Five-Star Roads



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Montana Driver Education and Training Standards and Benchmarks

1. Laws and Highway System

- 1.1. know the laws outlined in the Montana Driver's manual;
- 1.2. understand the laws outlined in the Montana Driver's Manual; and
- 1.3. consistently demonstrate knowledge and understanding by responsible adherence to highway transportation system traffic laws and control devices.

2. Responsibility

- 2.1. recognize the importance of making safe and responsible decisions for owning and operating a motor vehicle;
- 2.2. demonstrate the ability to make appropriate decisions while operating a motor vehicle;
- 2.3. consistently display respect for other users of the highway transportation system; and
- 2.4. develop positive habits and attitudes for responsible driving.

3. Visual Skills

- 3.1. know proper visual skills for operating a motor vehicle;
- 3.2. communicate and explain proper visual skills for operating a motor vehicle;
- 3.3. demonstrate the use of proper visual skills for operating a motor vehicle; and
- 3.4. develop habits and attitudes with regard to proper visual skills.

4. Vehicle Control

- 4.1. demonstrate smooth, safe and efficient operation of a motor vehicle; and
- 4.2. develop positive habits and attitudes relative to safe, efficient and smooth vehicle operation.

(continued on next slide)

Montana Driver Education and Training Standards and Benchmarks

5. Communication

- 5.1. consistently communicate driving intentions (i.e., use of lights, vehicle position, and personal signals);
- 5.2. adjust driver behavior based on observation of the highway transportation system and other roadway users;
- 5.3. adjust communication (i.e., use of lights, vehicle position, and personal signals) based on observation of the highway transportation system and other users; and
- 5.4. develop positive habits and attitudes for effective communication.

6. Risk Management

- 6.1. understand driver risk-management principles;
- 6.2. demonstrate driver risk-management strategies; and
- 6.3. develop positive habits and attitudes for effective driver risk-management.

7. Lifelong Learning

- 7.1. identify and use a range of learning strategies required to acquire or retain knowledge, positive driving habits, and driving skills for lifelong learning;
- 7.2. establish learning goals that are based on an understanding of one's own current and future learning needs; and
- 7.3. demonstrate knowledge and ability to make informed decisions required for positive driving habits, effective performance, and adaptation to change.

8. Driving Experience

- 8.1. acquire at least the minimum number of BTW hours over at least the minimum number of days, as required by law, with a Montana-approved driver education teacher; and
- 8.2. acquire additional behind-the-wheel driving experience with a parent or guardian's assistance in a variety of driving situations (i.e., night, adverse weather, gravel road, etc.).